Yura-Oishi Declaration; For the Ecological Development of the Coastal Zone

Introduction

The world population reaches 6 billion and is growing continuously. It is predicted to continue high growth of the world population reaching to 8 billion and 6 billion people will be settled on the coastal zone in the year 2025. The coastal zone where source of variety of species, has currently arisen many kinds of issues. In the Near future, we will be faced tremendous symbiotic conflicts between human activities and ecosystems around the world.

In Osaka Bay Area, it has arisen many problems originated from population growth and human activities as shown in the its history. Based on the lessons from the history, some leading projects have been proceeded to solve those problems. We need to improve those leading projects in Osaka Bay Area emphasizing standpoints from the sea and to propose the future symbiotic model of coastal zone. That will lead the model of ecological development in the coastal zone around world.

In the Southern part of Sumoto City, it still remains wealthy ecosystems of the sea and the land, and local people's living culture/custom harmonizing with ecosystem. Therefore, Yura-Oishi Area must be the real area for discussing the ecological development of the coastal zone. Here in Yura, people of the wisdom and information assemble from the world to promote the discussions for the future prospect of the coastal zone.

Ⅰ. For the Ecological Development of the Coastal Zone

1. Characteristics and Problems Arisen in the Coastal Zone

(1) Characteristics of Coastal Zone

The coastal zone is formulated as an area consists of land and sea putting shoreline between them. There, the land and the sea interact each other and foster the circulation of substances.

At the front of interactions, shorelines are characterized to natural landscapes such as sand beaches, rocky shores, and tidal flats. In lower part of river mouth, mixing of fresh and salt water creates estuary where organisms are incubated and provided nutrient salts and dissolved ingredients of very small quality from the land and form affluent ecosystems.

On the other hand, since the coastal land is desirable for people as the living spaces, industrial spaces, and recreational spaces, human activities have been accumulated there.

People look for food, resources and spaces for recreation in the coastal land. Also coastal land has been deeply related with human activities of other land area via ocean, newly value and culture has been created by exchanging different culture value and active trade.

(2) Problems Arisen in the Coastal Zone and Coastal Sea

The coastal zone has been carrying wide range of problems around the world such as degradation of living environment due to over population, increase of environmental impacts caused by rapid and unplanned developments without ecological consideration, conflict of coastal stakeholder, marine pollution, shore erosion, natural disaster, exhaustion of natural resources.

Progress of human society has degraded environmental quality while it has promoted concentration of population and industry. The degradation of environments has been mostly focused on living environments on the land area. It has become obvious that we must consider the environmental degradation of habitat and other environmental problems arisen in the coastal zone.

Coastal sea facing to the waterfront of concentrated human activities has been playing the role of covering up problems of the land area. Such as landfill for waste, land reclamation for providing industrial space, etc. Shoreline has been covered by vertical revetment to secure land area in cheap. Coastal sea has been isolated from the land area and utilized based on the standpoint of the land without considering the viewpoint and characteristics of the sea area.

Rapid urbanization and industrialization have brought the rapid population increase in coastal area around the world. On the other hand, there appears tourist increase in certain places. These situations have accelerated land reclamation for industrial spaces, developments of port/harbor and marina, establishment of aquaculture facilities, developments of tourism facilities not only on coastal sea area but also on coastal land area. These human activities have brought devastation of the coastal zone as well as the dumping of massive waste to the sea and excess exploitation of fisheries resources.

Natural landscape of the coastal zone such as sand beaches, rocky shores, tidal flats, wetland, etc. including mangroves has been destroyed, and consequently shallow water area and seaweed bed are dying out. These landscapes are identified as important environments for incubating marine organisms as well as their habitat, so that if they are lost, marine ecosystems will also lose their functions of material circulation and natural purification.

When rich nutrient salts flow into the suffered sea area from the land, it will lose keeping

balance of production, assimilation and decomposition in the ecosystem, and will lead exceeding primary production, and consequent degradation of environments such as red tide and oxygen depression in bottom layer. Thus, the degradation of environments will cause poor fauna and flora in sea area. Besides, chemical substance and heavy metal from land area cause biological accumulation, and deteriorate to endocrine-disrupting chemicals, which takes the procreative power of marine organisms.

To achieve ecological development, we must always put ourselves to consider environments from viewpoint of the sea and focus our viewpoints on coastal sea area. All the burdens originated by human activities without considering the symbiosis with marine ecosystems may be accumulated in the coastal sea area. And, if the coastal sea area asset, we ourselves may be afraid of facing the death.

2. Basic strategy for the ecological development of the coastal zone

(1) Establishment of Sustainable Social System

To achieve the sustainable development in the coastal zone, the first effort we have to do is changing ourselves towards the establishment of sustainable social system where human activities and surrounding environments are in good relation of symbiosis. In recent year, the environmental consciousness has been being enhanced among both producers and consumers. But, activities towards the establishment of sustainable social system have just started.

People have to study the relationship between lives and ecosystems and to respond positively to environmental problems arisen around ourselves. The producers have to consider the standpoints of both ecosystem and consumer and to establish the industrial systems that realize resource circulation and zero-emission of waste. In the sectors of transportation/logistics, urban development and waste disposal management, it is required to collect/share the information and ideas and to implement the measures for solving problems giving top priority to environments.

For that, it is necessary to establish facilities which will play fundamental and important role of education, research, evaluation and information exchange of marine environments.

(2) Importance of Material Circulation in the Coastal Zone and Restoration and Creation of Environment of the Coastal Sea

Many kinds of substances flow into the coastal sea area from the land through rivers. Some of those substances flows out to the ocean, but a lot amount of them stay in the coastal sea area and degrade water quality and bottom sediment. The coastal zone played a role of circulation of

piled-up matter to the land area cooperated with human activities deployed there in many years ago so that critical water pollution or eutrophication was not occurred.

The mechanism of substance circulation in the coastal sea area is as follows:

Substances flowed into the sea area are assimilated by marine organisms such as plankton and those organisms become food for bigger marine animals such as fishes and shellfishes which finally become seafood for people, or through the assimilation by benthic animals they are taken away by birds.

At one time, the coastal area was egg-laying, incubating and growing sites for fishes providing seaweed bed in the shallow water area. So that, it provides high productivity of fisheries and habitat for birds. However, those spaces for marine animals and birds have been reduced with the increase of human activities around the coastal zone.

Human being must recognize the importance of symbiotic relation with abundant ecosystem by the nutrient salt feedback mechanism to land area. In future, we must to help reproducing and maintaining abundant ecosystem, of course not to obstruct reproduction of marine organism. In addition, it is necessary to rebuilt infrastructure what can restore the ecological function in the ecological disrupted coastal area by human infrastructures.

(3) Integrated Coastal Management (for Ecological Coastal Management)

People have considered that the role of coastal sea area was providing spaces for the development of the coastal land area. On the other hand, the coastal land area was used to suffering big damages by the natural power, so that people considered the coastal land areas being confronted with the coastal sea area at onetime. As the results of these standpoints, the coastal sea area was truckled from the sea and was identified as the space of utilization and/or disposal. Namely, its role such as assimilation of nutrient, incubation, etc. has not been considered important.

As the results, human activities have moved to the coastal zone and forest in the mountain has been neglected. We have to pay attention that resulting effects may accelerate the devastation of the coastal zone.

We have to recognize that the coastal sea area is an important environmental asset for the coastal land area. We have to establish the ecological coastal management from the viewpoint of the sea including the viewpoint of marine organisms to achieve the ecological development of the coastal zone.

To develop the ecological coastal management, it is necessary to understand that forest, river

and sea consist of an ecologically connected ecosystem, to proceed the research works on the functions of sand beaches, rocky shores and tidal flats as well as the seaweed bed in the shallow water sea area, to make clear what is the desirable environment and to continue observations and investigations through the field studies. Then we are able to make the catalogue of the coastal zone environments and finally to find out the practical measures of environmental restoration and creation.

We have to identify areas first, for preservation, for restoration/creation and for utilization keeping symbiotic relation with fauna and flora. And then, we have to propose practical measures including applicable technologies, management program, necessary budget, etc. For the achievement of environmental management of coastal zone in Osaka Bay Area, we have to proceed research/development works on environmental impact assessment, on planning/implementation of ecological coastal-zone management and on technologies for preservation/restoration of fauna and flora in coastal zone.

It is necessary for administration authorities to recognize the ecological coastal-zone management as the most important strategies for the sustainable development of the earth system. It is also necessary for them to support research and development activities, to concentrate intelligence/consensus from various fields of academia and industries as well as citizens, and to propose scheme of ecological coastal-zone management.

Ⅱ. *Toward the Future Model of Osaka Bay Area and the Future Prospect of Yura-Oishi Research Village*

1. *Development Scheme of Osaka Bay Area and Action Principle*

Osaka Bay has been playing an important role as the socio-economic infrastructure in the Osaka Bay Area. However, since the Osaka Bay is an enclosed sea area is apt to be influenced by pollutant loads from the land area, it has suffered from the degradation of sea water and bottom sediment qualities and has lost the biodiversity significantly. We can easily understand that the environmental degradation is serious in the Northern bottom area of the Osaka Bay, where we have to restore the habitat for various marine organisms reducing the pollutant load from the land and providing shallow water area such as sand beaches, rocky shores, tidal flats as well as seaweed beds. On the other hand, it is necessary to preserve the current sound environments in the Kitan-Kaikyo Strait and surrounding area where land and sea environments have been kept in sound.

In the coastal land area of the Osaka Bay, local governments have started to establish the environmental general plan and to develop communities reflecting symbiosis with environment. However, Hanshin-Awaji Earthquake (January 17, 1995) revealed problems of locally concentrated metropolis and proposed the necessity of conversion to the new network cities of autonomic and function dispersed. It was also proposed that the community must meet the requirements of disaster prevention and environmental restoration. The Osaka Bay Area had prospered as a center of Japanese economy and culture since ancient time, and is now, required to be the leading base of Japan and to play a role as the leading center of Asian prospect in the future and is strongly hoped to achieve the environmental symbiosis.

In the next millennium, Osaka Bay Area is expected to be a model of advanced civilization. For this, it is necessary to pursue environmental restoration and wise use of coastal zone.

There are some measures toward the future as shown below.

① We must establish a grand-plan for coastal environment of Osaka Bay that fosters desirable characteristics of ecosystems and human societies in the coastal sea and land area. The grand plan is to be a common agenda for citizens, industries and administration.

② We must establish environmental management system which can flexibly correspond to future changes of environmental situation. For the base of environmental management system, and to build the environmental data bank, it is necessary to acquired environmental data monitoring of sea conditions, water and sediment quality, species and etc.

③ Integrated management system of various marine utilization such as fishing, marine transportation, tourism, marine sports, nature observations and environmental studies are needed to be established. Special attention should be paid for restoring habitat for various species even port/harbor area or industrial zone. It is also needed to secure the public access and fishing within the limit of not to disturb main purpose of the space. It is also necessary to utilize the space for different purposes.

④ We are requested to provide a master-plan for the urban development and a scheme for land-use (land size planning) based on the concept of environmental restoration of the coastal zone, and to set work of long-term action towards the realization of those plans connecting with the "Law concerning the Development of the Coastal Zone of Osaka Bay Area"

2. Yura-Oishi Research Village and Expected Research Subjects

Yura-Oishi Research Village Area occupies an area of 5,000ha from Yura to Kaminada and surrounding sea and land in the Southern part of Sumoto City, where local residents have been passing down life-style and culture/customs of deeply related to the sea and the mountains.

They still keep desirable relationship with nature and precious cultural resources in this area concerning way of fishing, recreational style and so on.

This area has diverse aspects in natural environments; thus we can observe the diversity of natural configuration and species.

① There remains sandy and rocky beaches, and tidal flats which are decreasing in the Osaka Bay, and exists specific marine organism. Especially in Kumata Area, various types of seaweed, sessile organisms and juvenile fishes can be observed.

② In Narugashima, it still remain precious seaside plants, as *Hibiscus hamabo*; a kind of mangroves which blooms yellow flower in summer and *Suaeda maritima* which covers some portion of tidal flat in soft.

③ Complex configuration of mountains fosters wealthy forests in the land area. There live a lot kind of insects such as *Papilio memnon* and *Enterpnosia chibensis*. Also, there remains precious habitat for some large mammals such as wild boar, deer and monkey.

④ Moreover, the neighborhood of the research village seems like a paradise for birds. Some kinds predatory birds such as *Pernis ptilorhynchus* and *Butastur indicus* and other type of birds such as *Erithacus cyanurus*, *Alcedo atthis*, *Ninox scutulata*, *Egretta intermedia*, *Charadrius alexandrinus* etc. have built nests around there.

The sea area surrounding Yura-Oishi Research Village; Kitan-Kaikyo Strait area has the best marine environment in Osaka Bay, though decrease of seaweed bed, degraded water quality, mass accumulation of drifted debris are observed in some parts as the indicators of environmental degradation. Basically, marine environments around Yura-Oishi Research Village Area are characterized as:

① This is an important sea area for tidal exchange between Kii-Suidou Strait/Pacific Ocean and Osaka Bay/Seto Inland Sea.

② There still remain various natural shores such as sand beach, rocky beach and tidal flat and wealthy seaweed bed.

③ There still remain natural forests which provide natural nutrient salt and small amount of useful ingredients for growing sea seeds. This area must be a model for the continuous land-sea environments.

④ The sea area of Oishi, Kumata and inner part of Yura Bay is known as egg-laying, incubating and nursing sites for juvenile fish.

⑤ This area is an important path for fishes come and go through this area so that many kind of fishes can be caught in the area.

In Yura-Oishi Research Village and surrounding area, there exist various species of different character and corresponding ecosystems, mutually related with each other in rather a narrow area. This fact is important for biodiversity of species and ecosystem existing in Yura-Oishi Research Village. This is the reason that we feel the invaluable interests in studying ecosystems, human activities and symbiotic relation observed there.

We have to achieve the regional development considering carefully individual species and corresponding ecosystem in the coastal zone where biodiversity is preserved. This is the definition of the Ecological Development of the Coastal Zone. After this definition, we address here as follows:

① We will identify the characteristics of species and ecosystems geographically and specifically, and discuss the prospective direction of the ecological development.

② We will discuss the possible scheme of the ecological development for whole ecosystem, existing in the coastal zone.

③ We will clearly define the future of the research village and direction of eco-industry development after the statements mentioned above.

Conclusion

It is invaluable to have opportunities of discussions for the ecological development of the coastal zone here in Yura-Oishi Research Village Area where abundant nature and unique living culture/custom have been kept and gateway of Osaka Bay Area that have been incubating the Japanese culture characterized by "symbiosis". We will start our activities based on the efforts and results towards the next millennium discussed in the symposium.

① Clarify the mechanism of land and sea environment and develop the desirable model for ecological management model coastal zone environment.

② Build and propose a grand plan to achieve environmental management of Osaka Bay Area and necessary partnership.

③ Hold the symposium periodically to promote the efforts, cooperation and partnership between people concerned.

■ International Symposium for the Ecological Development of the Coastal Zone Panelists/ Executive Committee

<Panelist>

Joseph R. Vadus	Vice President, IEEE Oceanic Engineering Society
Hajime Kadota	Emeritus Professor, Kyoto University
Kazutoshi Yabuki	Emeritus Professor, Osaka Prefecture University
Keijin Kamino	Emeritus Professor, Osaka University／Professor, Tezukayama University
James A. Van Tine	SPO, Habitat Restoration in Campbell River, HEB, DFO, CANADA
Naosuke Itoigawa	Emeritus Professor, Osaka University／Professor, Mukogawa Women's University
Hideki Ueshima	Chugoku National Industrial Research Institute, MITI／Professor, Tokushima University
Hiroyuki Nakahara	Professor, Kyoto University
Ryusuke Hosoda	Professor, Osaka Prefecture University
Buichiro Murata	Secretary Genneral, Research Committee on Osaka Bay Area Mega-Infrastructure

<Executive Committee>

Ryusuke Hosoda	Professor, Osaka Prefecture Univ.／Chairman of Research Committee of the Environmental Monitoring／Chairman of Research Committee of Marine Environment
Naosuke Itoigawa	Emeritus Professor, Osaka University／Professor, Mukogawa Women's University Chairman of Yura-Oishi Research Village Organizing Council
Masahisa Koriyama	Chairman, Research Committee on Osaka Bay Area Mega-Infrastructure
Buichiro Murata	Secretary Genneral, Research Committee on Osaka Bay Area Mega-Infrastructure

■ Secretariat

Research Committee on Osaka Bay Area Mega-Infrastructure

c/o IBC-FORUM Kitahama-Matsuoka Bldg.2-1-26 Kitahama, Chuo-ku, Osaka 541-0041 JAPAN

PHONE:+81-6-6203-6061 FAX:+81-6-6203-7401